10/518145
PT12 Rec'd PCT/PTO 17 DEC 2004

Other objects of the present invention are as follows:

To provide a slide fastener that allows a curved fastener tape to be easily fabricated with an extremely simple structure and does not cause sewing wrinkles for the fastener tape when the fastener tape is sewed on a joining material;

To provide a slide fastener that allows fastener elements to be attached to a folded part formed by folding a fastener tape double with a simple structure and stable configuration;

To provide a slide fastener that facilitates firm attachment of fastener elements by reinforcing the folded part formed by folding a fastener tape double;

To provide a slide fastener that facilitates firm attachment of single-piece fastener elements, in particular, by reinforcing the folded part formed by folding a fastener tape double and the peripheral area thereof;

To provide a slide fastener that allows the product to be supplied at a low cost by specifying the configuration of a fastener tape so that the fastener tape can have special performance easily; and

To provide a slide fastener that allows a fastener tape to easily have electromagnetic wave shield performance or further special performance such as fire-resistant performance.

In order to achieve the above objects, the present invention employs the following configurations.

In a slide fastener according to the present invention, a folded part 4 is formed by folding a first edge part 12 of a fastener tape 2 inward to overlay the folded parts, a fastener element 3 is attached to the folded part 4 of the overlaid structure, and the fastener tape 2 in the vicinity of the installation part 5 of the fastener element 3 is sewn with a sewing thread 6 continuously extending in the longitudinal direction of the fastener tape 2.

Here, the part of the fastener tape 2, to which the fastener element 3 is attached may be single-layered or double-layered.

The configuration has an effect of reinforcing the edge part of a fastener tape and

assuring the attachment of a fastener element in a stable state by folding the edge part of the fastener tape inward, thus forming the folded part, and attaching the fastener element to the folded part.

In addition, the fastener element is attached to the edge part of the fastener tape and vicinity area of the installation part of the fastener element is sewn with the sewing thread. Accordingly, the fastener tape is tightened in the longitudinal direction thereof and thus the edge part thereof is curved toward the inner side of the tape. Consequently, the configuration has an effect of providing, at a low cost, a high quality slide fastener capable of avoiding the phenomenon of a waved fastener tape, namely sewing wrinkles, resulted from sewing shrinkage caused when a fastener stringer is attached to a joining material by sewing

In a slide fastener according to the present invention, a core material 8 formed in various shapes is inserted into the folded part 4 formed at a first edge part 12 of a fastener tape 2 to reinforce the folded part 4, a fastener element 3 is attached to the folded part 4 with the core material 8 being interposed, and the fastener tape 2 in the vicinity of the installation part 5 of the fastener element 3 is sewn with a sewing thread 6 continuously extending in the longitudinal direction of the fastener tape 2.

As the core material 8, it is preferable to use a core material 8 formed with a core string 10 attached to an edge of a support piece 11.

The configuration has an effect of reinforcing the edge part of a fastener tape and assuring the firm installation attachment of a fastener element in a stable state by inserting a core material into the folded part of the fastener tape or into the folded part and the peripheral area thereof, and thus attaching the fastener element with the core material being interposed. By providing a core string to the core material, the reinforcing effect is further enhanced.

Brief Description of Drawings

Figure 1 is a front view showing a slide fastener according to an embodiment of the present invention;

Figure 3 is a cross sectional view showing a fastener stringer having a coiled filament fastener element in the slide fastener;

Figure 4 is a cross sectional view showing a similar fastener stringer as according to still another embodiment;

Figure 5 is a cross sectional view showing a fastener stringer having a single-piece fastener element made of metal in a slide fastener;

Figure 6 is a cross sectional view showing a similar fastener stringer according to further embodiment;

Figure 7 is a front view showing a curved fastener tape;

Figure 8 is a perspective view showing a known electromagnetic wave shield slide fastener;

Best mode for Carrying out the Invention

The embodiments of slide fasteners according to the present invention are hereunder specifically explained referring to the drawings.

Figure 1 shows a slide fastener according to the present invention.

As the first feature of the slide fastener, a special performance mechanism is provided to the basic functions of the slide faster. More specifically, in order to provide the faster tape 2 of a fastener stringer 1 with electromagnetic wave shield performance, metal plating is applied onto the surface of the fastener tape 2 to form a shield coating 7. In addition, in order to provide the fastener tape 2 further with fire-resistant performance, the surface of the shield coating 7 formed on the surface of the fastener tape 2 is coated with a fire-resistant additive and thus the fire-resistant coating 7 is formed.

The second feature of the slide fastener is as follows. Before attaching fastener elements 3 to the fastener tape 2 of a fastener stringer 1, the fastener tape 2 is sewn with a

sewing thread 6 so that the entire part of a first edge part 12 of the tape 2 is curved inward, as shown in Fig. 7, regardless of whether a core material 8 is provided at the edge part 12 of the tape 2 or not. Thus, the surface of the fastener tape 2 does not cause sewing wrinkles when the fastener stringer 1 is attached to a joining material. Here, in the figure, the reference numerals 20, 21 and 22 show a slider, an opener and a stopper, respectively.

As shown in Fig. 3, the fastener tape 2 of a fastener stringer 1 is formed by a single strip of tape. The fastener tape 2 is fabricated by: producing a base material of the fastener tape 2 having a plain weave structure using a polyester-base fiber or a polyamide-base fiber as a warp and a weft; then applying hot-dip plating to both of the front and back surfaces of the base material of the fastener tape 2, (for example, plating is given on both surfaces of the fastener tape 2 by immersing the tape in melted solution of copper and nickel); and thus forming a shield coating 7.

The reason why a plain weave structure is employed for the fastener tape 2 used herein is that the plating solution and the fire-resistant additive are likely to infiltrate uniformly into the whole body of the tape 2 with its uniform structure over the whole body, and the tape 2 can be made at a low cost. However, as a tape with uniform structure over the whole body, not only a plain weave structure but also other structures may be employed. For example, a warp-knitted tape or a nonwoven fabric formed by interlacing fibers may also be employed. In any case, it is preferable that plating or fire-resistant additive coating is applied to the surface of a fastener tape 2 in the state of a straight shape.

If the tape is curved, it is difficult to immerse many tapes in a plating bath while arranging them in an orderly manner and it is extremely difficult to process them while continuously transferring them to coating equipment. Therefore, the fastener tape 2 is preferably treated in the state of a straight shape.

After forming a shield coating 7 on both surfaces of a fastener tape 2, the fastener tape 2 is sewn with the sewing thread 6 continuously extending in the longitudinal direction of the fastener tape 2 in the vicinity of the first edge part 12, namely in the vicinity of the installation part 5 to which a fastener element 3 is attached. Accordingly,

the fastener tape 2 is tightened in the longitudinal direction thereof and formed into such a shape that the edge part 12 of the fastener tape 2 is curved inward relative to the longitudinal direction. As a type of sewing with the sewing thread 6, the lock stitch type is preferable. The lock stitch is simple and makes it possible to save a sewing thread and to produce the fastener tape 2 at a low cost.

In a case of the fastener tape 2 fixed in a curved shape, as shown in Fig. 3, at the first edge part 12 of the fastener tape 2, a leg 15 of a coiled filament fastener element 14 into which a core string 10 is inserted is attached to the fastener tape 2 with an attachment thread 18 of double-ring stitch. Consequently, the lock-stitch sewing thread 6 is disposed in the vicinity of a connecting part 17 of the coiled filament fastener element 14. The attachment of the fastener element 3 to the curved fastener tape 2 causes no problem because the fastener element 3 is attached while the curved fastener tape 2 is held in the state of a straight shape. Consequently, there is the advantage that, when the finished curved fastener stringer 1 is sewn on a joining material, even though a second edge part of the fastener tape 2 is tightened in the longitudinal direction thereof by machine sewing, the phenomenon of the wavy surface of the fastener tape 2, namely sewing wrinkles, can be avoided.

In the present embodiment, in order to provide fire-resistant performance to the fastener tape 2 further after the shield coating 7 is formed on the surface of the fastener tape 2 by plating, a fire-resistant additive such as an inorganic salt, a halogen compound, or a phosphoric acid ester is applied by coating onto the surface of the shield coating 7 on the fastener tape 2 and thus the fire-resistant performance is also provided. As a consequence, a fastener stringer 1 having both the electromagnetic wave shield performance and the fire-resistant performance at the same time is made.

In the present embodiment, an edge part 12 of the fastener tape 2 is folded inward to make a folded part 4, and an end part 19 of the fastener tape 2 itself is sewn on the fastener tape 2 with a lock stitch sewing thread 6. Then, the sewing thread 6 is stretched to curve the fastener tape 2, and at the same time the edge part 12 is reinforced. After that, a core string 10 is inserted into a coiled filament fastener element 14 and the fastener

element 14 is attached onto the surface of the folded part 4 of the curved fastener tape 2 with the attachment thread 18 of double-ring stitch. Thus the fastener stringer 1 is completed.

The fire-resistant performance is not necessarily provided, or the coating 7 of a fire-resistant additive may be formed instead of plating. The filament fastener element 14 attached to a fastener tape 2 is not limited to a coil shape, and a zigzag filament fastener element 14 may be used. Here, the reference numeral 16 in the figure shows a fitting head.

According to the present embodiment, the following advantages can be obtained.

By attaching the fastener element 3 to the first edge part of the fastener tape 2 and sewing the fastener tape 2 in the vicinity of the installation part of the fastener element 3 with a sewing thread 6, the edge part can be curved inward.

By plating the surface of the fastener tape 2 to form a plating film and further coating the surface thereof with the fire-resistant additive to form a coating 7, the electromagnetic wave shield performance by plating and the fire-resistant performance by fire-resistant additive coating are easily secured, which has an effect of making a high quality product at a low cost.

Herein, since the fastener tape 2 is made of fiber and allows the plating solution and the fire-resistant additive to infiltrate uniformly into the whole body of the tape, the treatment of electromagnetic wave shielding by plating and the treatment of coating of a fire-resistant additive can be applied to the fastener tape 2 extremely easily, which has an effect of making a high quality product at a low cost.

As explained above, the present embodiment provides the effects of: being able to easily produce the slide fastener having both electromagnetic wave shield performance and fire-resistant performance by a coating 7 at a reduced production cost; and moreover being able to provide, at low cost, the high quality slide fastener that can avoid the phenomenon of a wavy tape, namely sewing wrinkles, because of the curved fastener tape 2, even when the fastener stringer 1 is attached to a joining material. In addition, by folding inward the first edge part of the fastener tape 2 to form the folded part 4 and

attaching the fastener element 3 to the folded part 4, the edge part of the fastener tape 2 is reinforced and the fastener element 3 can be attached in a stable state.

Like the aforementioned embodiment shown in Fig. 3, the fastener stringer 1 shown in Fig. 4 is produced by forming the folded part 4 on a fastener tape 2 of the fastener stringer 1 and forming a shield coating 7 on both surfaces of the fastener tape 2. It is different from the embodiment of Fig. 3 in the following points.

In the present embodiment, the fastener tape 2 is folded to form an overlaid part, a core material 8 formed from a sheet of flat reinforcement 9 is inserted into the overlaid part of the folded fastener tape 2, and thus the folded part 4 of the fastener tape 2 is reinforced.

Here, the reinforcement 9 continuously extends in the longitudinal direction of the fastener tape 2 and is a narrow tape made by weaving fabric or knitting with fabrics such as polyester fiber, polyamide fiber or the like.

The fastener tape 2 is sewn at an end part 19 thereof with a lock stitch sewing thread 6 and formed so that the whole body of the fastener tape 2 is curved, and thereafter, a coiled filament fastener element 14 into which a core string 10 is inserted is attached onto the surface of the folded part 4 with an attachment thread 18 of double-ring stitch.

According to the present embodiment, the following advantages can be obtained in addition to the advantages of the embodiment shown in Fig. 3.

By inserting the core material 8 into the folded part of the fastener tape 2 and attaching a fastener element 3 thereto with the core material 9 *(Translator's comment: the core material 8)* being interposed, the edge part of the fastener tape 2 is reinforced and the fastener element 3 can firmly be attached in a stable state.

Like the aforementioned embodiment shown in Fig. 3, the fastener stringer 1 shown in Fig. 5 is produced by folding a fastener tape 2 having electromagnetic wave shield performance by forming a shield coating 7 or further having a fire-resistant additive coating 7 on both surfaces of the fastener tape 2 to form a folded part 4.

10/518145
PT12 Rec'd PCT/PTO 17 DEC 2004

CLAIMS

1. (Deleted)

2. (Deleted)

3. A slide fastener, wherein a first edge part (12) of a fastener tape (2) is folded inward to form a folded part (4); a fastener element (3) is attached to the folded part (4); and the fastener tape (2) is sewn in the vicinity of an installation part (5) of the fastener element (3) with a sewing thread (6).

4. (Amended) The slide fastener according to claim 3, wherein a core material (8) is inserted into the folded part (4) of the fastener tape (2); and the fastener element (3) is attached with the core material (8) being interposed.

5. A slide fastener, wherein a first edge part (12) of a fastener tape (2) is folded inward to form a folded part (4); a core material (8) is inserted into the folded part (4); a fastener element (3) is attached to the folded part (4) with the core material (8) being interposed; and the fastener tape (2) is sewn in the vicinity of an installation part (5) of the fastener element (3) with a sewing thread (6).

6. The slide fastener according to claim 4 or 5, wherein the core material (8) has a core string (10) at an edge of a support piece (11).

7. (Amended) The slide fastener according to any one of claims 3 to 6, wherein the fastener element (3) is attached in a manner of clamping the folded part (4).

8. The slide fastener according to claim 7, wherein the fastener element (3) is made of metal and has a fitting head (16) and a pair of legs (15) projecting from the fitting head (16); and the legs (15) clamp the folded part (4).

9. (Amended) The slide fastener according to any one of claims 3 to 8, wherein the fastener tape (2) is made of fiber and is infiltrated with a plating solution or a fire-resistant additive.

10. The slide fastener according to claim 9, wherein the fastener tape (2) has a plain weave structure.

11. (Amended) The slide fastener according to any one of claims 3 to 10, wherein plating is applied onto the surface of the fastener tape (2) so that electromagnetic wave

shield performance is provided.

12. (Amended) The slide fastener according to any one of claims 3 to 11, wherein a fire-resistant additive is applied onto the surface of the fastener tape (2) by coating so that fire-resistant performance is provided.

FIG.2

FIG.3